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10/567,339	11/30/2006	Yoshitaka Hara	285598US2PCT	5325
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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER PILAPITIYA, NALIN B	
			ART UNIT	PAPER NUMBER
			2617	
			NOTIFICATION DATE	DELIVERY MODE
			12/29/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/567,339	Applicant(s) HARA ET AL.	
	Examiner NALIN PILAPITIYA	Art Unit 2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 2/06/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☒ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: The acronym “SDM” can mean different things and/or change in meaning over time; hence, it would be desirable to write out the actual word to which the acronym refers. Appropriate correction is required.
2. Claim 7 is objected to because of the following informalities: The acronym “SDM” can mean different things and/or change in meaning over time; hence, it would be desirable to write out the actual word to which the acronym refers. Appropriate correction is required.
3. Claim 8 is objected to because of the following informalities: The acronym “SDM” can mean different things and/or change in meaning over time; hence, it would be desirable to write out the actual word to which the acronym refers. Appropriate correction is required.
4. Claim 12 is objected to because of the following informalities: The acronym “SDM” can mean different things and/or change in meaning over time; hence, it would be desirable to write out the actual word to which the acronym refers. Appropriate correction is required.
5. Claim 17 is objected to because of the following informalities: The acronym “SDM” can mean different things and/or change in meaning over time; hence, it would be desirable to write out the actual word to which the acronym refers. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim 1, 2, and 4 -14, and 16- 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Walton et al. (Pub. No.: US 2003/0125040 A1).

Re claim 1, Walton discloses a radio transmission control method for a MIMO system (fig. 2b), the MIMO system comprising a radio transmitter apparatus (fig. 2b object 104) having a plurality of antennas and a radio receiver apparatus (fig. 2b object 106n) having a plurality of antennas for transmitting a plurality of signals to each other through SDM, the method comprising the steps of: sending a pilot signal by the radio transmitter apparatus (paragraph 80); receiving the pilot signal and estimating transmission-related information corresponding to the pilot signal by the radio receiver apparatus (paragraph 80, 97, and 177); selecting a transmission signal to be used in the radio transmitter apparatus based on the estimated transmission-related information (paragraph 81 - 82); notifying the radio transmitter apparatus of a control signal describing the transmission signal to be used (paragraph 82); and selecting an antenna to be used based on the control signal and sending the

information signal from the selected antenna to the radio receiver apparatus, by the radio transmitter apparatus (paragraph 82).

Re claim 13 and 20, this system claim corresponds to the above method claim and therefore the analysis for this rejection has already been done.

Re claim 2, Walton discloses a radio transmission control method according to claim 1, wherein the transmission-related information estimated by the radio receiver apparatus is a propagation vector representing a correlation between the received pilot signal and a known pilot signal (72, 97, and 177).

Re claim 14, this system claim corresponds to the above method claim and therefore the analysis for this rejection has already been done.

Re claim 4, Walton disclose a radio transmission control method according to claim 2, wherein the transmission signal to be used selected by the radio receiver apparatus is a predetermined number of transmission signals selected from among a plurality of transmission signals so that a spatial correlation to one another based on the propagation vector becomes small (paragraph 160).

Re claim 16, this system claim corresponds to the above method claim and therefore the analysis for this rejection has already been done.

Re claim 5, Walton disclose a radio transmission control method according to claim 2, wherein the step of selecting the transmission signal to be used comprises the steps of: selecting all combinations of the plurality of transmission signals (paragraph 80 - 82); predicting an output SINR based on the

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propagation vector obtained by the radio receiver apparatus in a case where a predetermined combination of the transmission signals is sent (paragraph 80 – 81 and 92);

determining an evaluation value with respect to the predetermined combination of the transmission signals, based on the predicted output SINR (paragraph 80 – 82 and 92); and

selecting a combination of the transmission signals having a largest evaluation value among the evaluation values with respect to all the combinations of the transmission signals (paragraph 80 – 82).

Re claim 6, Walton discloses a radio transmission control method according to claim 2, wherein the step of selecting the transmission signal to be used comprises the steps of:

selecting all combinations of a plurality of transmission signals (paragraph 80 – 82);

predicting an output SINR based on the propagation vector obtained by the radio receiver apparatus in a case where a predetermined combination of the transmission signals is sent (paragraph 80 – 82 and 92);

determining an evaluation value with respect to the predetermined combination of the transmission signals, based on the predicted output SINR (paragraph 80 – 82 and 92); and

selecting a combination of the transmission signals having a largest evaluation value among the evaluation values with respect to all the combinations of the

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transmission signals (80 – 82) and selecting a transmission format number determined based on an output SINR of each transmission signal of the selected combination, as the transmission signal to be used, by consulting a table describing a correspondence relationship among a transmission format number, an output SINR, a transmission format, and a transmission speed (table 2 and paragraph 101).

Re claim 18, this system claim corresponds to the above method claim and therefore the analysis for this rejection has already been done.

Re claim 17, this system claim corresponds to the above method claim and therefore the analysis for this rejection has already been done.

Re claim 7, Walton discloses a radio transmission control method according to claim 1, wherein, by applying a multi-carrier transmission system to SDM transmission between the radio transmitter apparatus and the radio receiver apparatus, each of the signal processing is performed individually for each carrier (paragraph 23, 25, and fig. 3E).

Re claim 8, Walton discloses a radio transmission control method according to claim 2, for a radio transmission apparatus control method, the radio transmission control method performing each of the following signal processing with respect to all sub-carriers by applying a multi-carrier transmission system to SDM transmission between the radio transmitter apparatus and the radio receiver apparatus (paragraph 23, 25, and fig. 3E), wherein the step of selecting the transmission signal to be used comprises the steps of:

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selecting all combinations of a plurality of transmission signals (paragraph 80 – 82);

predicting an average output SINR based on the propagation vector obtained by the radio receiver apparatus in a case where a predetermined combination of the transmission signals is sent (paragraph 80 - 82 and 92);

determining an evaluation value with respect to the predetermined combination of the transmission signals, based on the predicted average output SINR (paragraph 80 – 82 and 92): and

selecting a combination of the transmission signals having a largest evaluation value among the evaluation values with respect to all the combinations of the transmission signals (paragraph 80 – 82).

Re claim 9, Walton discloses a radio transmission control method according to claim 1, wherein the step of sending the pilot signal comprises sending the pilot signal from each transmission beam (paragraph 148, 97, and 177);

the step of selecting the transmission signal to be used comprises selecting a transmission beam to be used (paragraph 148);

the step of notifying comprises notifying the radio transmitter apparatus of the transmission beam to be used with a control signal (paragraph 148); and

the step of sending the information signal comprises selecting a transmission beam to be used based on the notified control signal, and sending an information

signal from the selected transmission beam to the radio receiver apparatus (paragraph 148).

Re claim 10, Walton discloses a radio transmission control method according to claim 1, wherein, as the pilot signal sent from the radio transmitter apparatus, a series of pilot signals previously determined between the radio transmitter apparatus and the radio receiver apparatus is used (paragraph 97 and 177).

Re claim 11, Walton discloses a radio transmission control method according to claim 2, wherein the step of selecting the transmission signal to be used comprises the steps of:
selecting all combinations of transmission power of a plurality of transmission signals (paragraph 105);
predicting an output SINR based on the propagation vector obtained by the radio receiver apparatus in a case where a predetermined combination of transmission power is sent (paragraph 105 and 93);
determining an evaluation value with respect to a predetermined combination of the transmission signals, based on the predicted output SINR (paragraph 368);
and selecting a combination of the transmission power having a largest evaluation value among the evaluation values with respect to all the combinations of the transmission power of the transmission signals and selecting a transmission format number and transmission power determined based on an output SINR of the transmission signal of each transmission power of the

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selected combination, as the transmission signal to be used, by consulting a table describing a correspondence relationship among a transmission format number, an output SINR, a transmission format, and a transmission speed (paragraph 304, 312, 368, and table 2).

Re claim 19, this system claim corresponds to the above method claim and therefore the analysis for this rejection has already been done.

Re claim 12, Walton discloses a radio transmission control method according to claim 1, wherein SDM transmission between the radio transmitter apparatus and the radio receiver apparatus is combined with a CDMA system (paragraph 10).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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9. Claims 3 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton et al. (Pub. No.: US 2003/0125040 A1) as applied to claims 2 and 14 above and further in view of Foschini et al. (Patent No.: US 6,317,466 B1).

Re claim 3 and 15, Walton discloses a radio transmission control method and apparatus according to claims 2 and 14, but fails to disclose wherein the transmission signal to be used selected by the radio receiver apparatus is a predetermined number of transmission signals selected in a decreasing order of a norm of the propagation vector.

However, Foschini discloses wherein the transmission signal to be used selected by the radio receiver apparatus is a predetermined number of transmission signals selected in a decreasing order of a norm of the propagation vector (paragraph 8, lines 4 – 14 and paragraph 8, lines 38 – 54 figures 3 and 6; figure 3 shows a stack of transmission signals in a decreasing order from top to bottom).

Therefore, one skilled in the art would have found it obvious from the combined teachings of “Walton” and “Foschini” as a whole to produce the invention as claimed with a reasonable expectation of achieving an order of transmission based on a norm of the propagation vector for the benefit of prioritizing the highest norm of the propagation vector, which is proportional to the SNR, to be first as explained in Foschini (column 8, lines 38 -54).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NALIN PILAPITIYA whose telephone number is (571)270-7122. The examiner can normally be reached on Monday - Friday 7:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rafael G. Perez can be reached on (571)272-7915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NALIN PILAPITIYA/
Examiner, Art Unit 2617

/Charles N. Appiah/
Supervisory Patent Examiner, Art Unit 2617